

West Nile Virus In Horses

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Department of
Agriculture**

Marketing and
Regulatory
Programs

Animal and Plant
Health Inspection
Service

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From: Eastern Regional Early Response Team (ERT)

Subject: Investigation of a Cluster of Equine Neurologic Illness -
Jamesport, NY

SUMMARY

From August 26, through October 8, 1999 a total of 18 cases of equine neurologic illness were diagnosed among horses residing in Suffolk County, New York. The illness was characterized by an acute onset of ataxia with rapidly progressive neuromuscular involvement leading to recumbency. The case mortality rate, including euthanized horses, was 44% (8/18). Based on clinical, serological and histological evidence, these cases are most likely attributable to a viral encephalitis, possibly caused by West Nile Virus.

INTRODUCTION

At the request of Dr. John Huntley, New York State Veterinarian, and under the direction of Dr. Jose Diez, Acting Director VS Eastern Regional Hub, members of the Eastern Regional Early Response Team (ERT) were deployed to investigate a cluster of cases of central nervous system disease among horses on Long Island, New York. The ERT assigned to investigate the illness consisted of Drs. Barry Meade, Area Epidemiology Officer (AEO), KY, Tom Varty, Veterinary Medical Officer (VMO), WI, Arch Wilson, Pathologist, National Veterinary Services Laboratory (NVSL), Todd Johnson, VMO, NY and Lyda Denny, State VMO, NY. Upon arrival in New York, the team was met by a USDA, Animal Plant Health Inspection Service (APHIS) representative from the Office of Legislative and Public Affairs. Following a short meeting to define goals, objectives and procedures, the team met with the equine practitioner from Laurel, NY, who reported the cases to query specific information from the practitioner concerning the diagnosed illness.

BACKGROUND

Since August 26, 1999, the practitioner had examined 18 cases of neurologic disease among horses from 13 separate case premises. The presenting signs varied in severity among the affected animals but consistently had acute onsets with rear limb ataxia. Only one case animal had an elevated temperature (102.8° F) and most continued to eat. Five animals tested positive for Equine Protozoal Myelitis (EPM) using a Western Blot technique; four from cerebral spinal fluid (CSF) samples and one from serum. Two animals had elevated herpes virus-1 (EHV-1) serum neutralization (SN) titers; one with a declining titer on a sample taken 25 days after the first. Treatment included antibiotics, analgesics, steroids, Thiamine and, in some cases, Pyrimethamine/Sulfadiazine (Drarprim), and Baycox. Of the 18 case



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animals, eight (44%) died or were euthanized while the remaining 10 animals were improving with supportive care. Vaccination practices for most owners of affected horses follow a Spring/Fall schedule of Flu, Equine Eastern/Western Encephalitis (EEE/WEE), tetanus, and Rhinopneumonitis (Herpes) and, while most horses on affected premise were not up-to-date on immunizations for EEE/WEE, 9 (50%) case animals had received EEE/WEE within the previous 6 months; two within 75 days of disease onset.

At the time the ERT was on-site, the last reported case had occurred on October 4, 1999 and had been necropsied by a pathologist from the Foreign Animal Disease Diagnostic Laboratory (FADDL) on Plum Island. No other reported cases occurred while the team was on Long Island.

METHODS

Epidemiological Investigation

From October 12-15, 1999 each of the 13 affected premises and one associated premise were visited by members of the ERT and either the owner or manager interviewed to obtain demographic information, symptoms, onset and duration of illness. A survey instrument was used to identify risk factors for equine neurologic disease and included questions related to management practices and exposure to insect and wildlife vectors. A case was defined as a horse with onset of illness since August 1, 1999 who resided on a premise on Long Island, New York accompanied by any one of the following symptoms or signs: fever ($>102.0^{\circ}$ F), lethargy, anorexia, ataxia, staggering, weakness to paralysis of the hind legs, dysphagia, depression, flaccid paralysis of the lower lip, impaired vision, head pressing or acute death.

An active case finding program was implemented and included telephone contacts with practitioners to determine whether other cases of equine neurologic disease had been identified in the area.

Convalescing animals were examined and video tapes/photos made of animals showing clinical signs.

Additionally, contact was made with the Director of the Cornell University Duck Research Laboratory in Eastport, NY to inquire about the health status of the duck populations among the commercial and university flocks on Long Island.

Individual premise investigations were entered into the Field Epidemiology Data System (FEDS) for documentation and transmittal to other involved parties. The survey questionnaire and information abstracted from investigation reports were entered into Epi Info Version 6.1B for further analysis.

Laboratory Investigation

Samples were obtained from ten convalescing animals which resided on the 13 affected premises. In addition, an effort was made to obtain samples from horses which were either commingled or on a premise which was co-owned or managed by an owner of a case animal at the time the animal was showing clinical signs.

A smaller number of other types of animals, including cows, swine, sheep, goats, and chickens were sampled as well as ducks raised at the Cornell University Research Laboratory to determine possible exposure risk to other species as well as to supplement general surveillance

efforts. A chicken from one of the affected premise was necropsied and specimens obtained for culturing/virus isolation.

All diagnostic specimens were obtained in duplicate and sent to both NVSL and the Center for Disease Control and Prevention (CDC) Vectorborne Laboratory in Fort Collins, CO for processing.

For all horses resident on affected premises, a request was made to include serologic testing for Herpes virus-1, Eastern/Western Equine Encephalitis, and EPM at NVSL.

Thirteen samples, ten serum and three CSF, that were collected by the local practitioner prior to the arrival of the ERT, were sent to NVSL and forwarded to CDC for West Nile Virus serology.

Environmental Investigation

Each premise was visually inspected for areas of standing water and wildlife habitat. Photos were taken to document areas of interest.

With the use of a hand held Global Positioning System (GPS) unit, latitude and longitude coordinates were obtained for each affected premise. A commercially available software mapping (Mapitude) package was use to produce maps for analysis.

Contact was made with the Supervising Environmentalist for the Suffolk County Department of Health Services and questions asked concerning surveillance activities and prevention or mitigation practices being carried out in the county.

RESULTS

Epidemiologic Investigation

Case finding

All 18 animals met the case definition for equine neurologic disease (Table 1). The mean age of cases was 15.5 years (range: 3 to 30 years); 44% (8/18) were over 20 years of age (Figure 1). Of the 18 case animals, ten were female, six were geldings and two were male. A total of 10 breeds were represented by case animals.

For area practitioners which were queried by phone, no other current cases were identified. However, a similar case was identified which had been referred to the New Bolton Center (Case No:46482), Kennett Square, PA in June 1998 from the same geographic location and with an identical presentation as the current cases. The animal was euthanized and a post-mortem diagnosis of encephalitis was given as a cause of death; the animal was negative for rabies. This information was provided to VS Emergency Program Staff for follow up.

Epidemic curve

A total of 144 horses reside on the 13 affected premises. The date of onset was available for all 18 case animals. The number of cases appears to be diminishing (Figure 2) with only two new cases occurring since October 17.

For those animals which didn't die acutely, the main presenting signs were ataxia of the rear legs and staggering. Owners noted depression in five animals which was described as attitudinal in nature instead

of somnolence and one animal had a flaccid paralysis of the lower lip. Two animals were anorexic and the ability eat was impaired in two other cases; both were recumbent and one died.

Of the animals which died or were euthanized, the average duration of illness was two days. For those animals who recovered, the average duration of illness was 6.2 days before clinical improvement was noted. For animals that were diagnosed with only ataxia or staggering, they showed improvement within two days. The four animals which became recumbent yet responded to therapy, took an average of 12.5 days to improve. Generally, the more severe the symptoms the longer the convalescent period.

Laboratory Investigation

A total of 79 horses from the 13 affected premises were sampled, including 11 animals which resided on a Thoroughbred farm that is managed by the owner of a case animal. A convenience sample was obtained from 7 chickens, 2 swine, 3 sheep, 1 goats, and 5 cows. In addition, 4 four sets of pooled cloacal swabs were obtained from chickens for culturing and 20 sera from ducks at the Cornell University Duck Research Laboratory were collected for general surveillance purposes.

Nervous tissue, obtained prior to the arrival of the ERT, was obtained from two case horses and submitted for culturing/virus isolation as well as histological examination. Preliminary results suggest a diffuse encephalomyelitis.

The ten serum samples collected by the private practitioner were positive to the West Nile Virus or other related flavivirus on serum neutralization tests. Eight samples had titers greater $\geq 1:320$ and two were positive at 1:160

All other laboratory results are pending.

Environmental Investigation

All premise surveyed shared a similar ecological environment with cases clustered in a 5 mile radius of each other (Map 1). Standing water, either in large pools or in barrel/watering areas, was evident on all affected premise. Dense vegetation, present along the borders of fences and in a few pastures, provides ground cover to a variety of small rodents, groundhogs or raccoons which the owners would see on a regular basis. Few recalled opossums in the area other than as road kill.

The public health environmentalist stated that aerial spraying was being discontinued in Suffolk County but fogging would continue on an as need basis. As with the owners of the case horses, the environmentalist didn't consider the insect burden to be excessive this year. However, his department is unable to estimate vector density based on the number of mosquito traps placed by their department. Interestingly, he stated that a case of human Malaria was diagnosed in the county this summer that could not be attributed to foreign travel.

DISCUSSION

The rapid onset of illness, clinical presentation in older horses and the occurrence of multiple cases on a given premise suggest that EPM,

regardless of positive diagnostic tests, is not the cause of this cluster of equine illness.

While the occurrence of herpes virus-1 infection in a animal that has demonstrated a declining titer in paired sera is suggestive of infection, it is unlikely that herpes virus is the cause of disease in horses stabled on multiple premise with a history of recent immunization among a significant portion of the animals.

Rabies has been ruled out based on negative results of one brain specimen and the occurrence of recovering horses.

The most likely cause of this cluster of illness is a viral encephalitis due to the West Nile or other related flavivirus. The serology specimens sent to NVSL and the tissue samples being processed at both NVSL and FADDL should establish a definite diagnosis.

RECOMMENDATIONS

Reports of equine neurologic cases, regardless of the state of origin, should be investigated by Foreign Animal Disease Diagnosticians (FADD) using the established protocol for FAD investigations. Of particular concern should be states located in close proximity to New York, or those who might be in the path of birds migrating south from the areas where the West Nile Virus has been demonstrated.

Consideration should be given by public health authorities to institute pesticide applications in areas where equine neurologic disease has been diagnosed and an evidence of mosquitoes is demonstrated. Conversely, equine owners should take precautions in areas where positive mosquitoes, birds, or human cases have been identified.

Direct application of insecticides to horses while biting insects are present in the immediate environment may be beneficial. Stabling of animals indoors at night has been shown to decrease the risk for other insect borne disease and should be encouraged.

Surveillance should include planning for placement or monitoring of sentinel animals in the affected area next year. This is of public health importance and VS efforts should be coordinated with local health department officials.

Research efforts should focus on transmission studies, particularly as it relates to the viremic period in horses, and development of a vaccine.

ADDENDUM

Since the October 17, 1999, two additional cases have been examined by the local equine practitioner. A phone consultation with the practitioner indicates that the animals are located in close proximity to the earlier cases in Suffolk County. One animal is recumbent and will be examined by a FADD. The other animal is a 17 year old Quarter Horse gelding with posterior paresis and ataxia. The animal continues to eat and has no fever. Serologic samples were collected from both animals and sent to NVSL for processing.

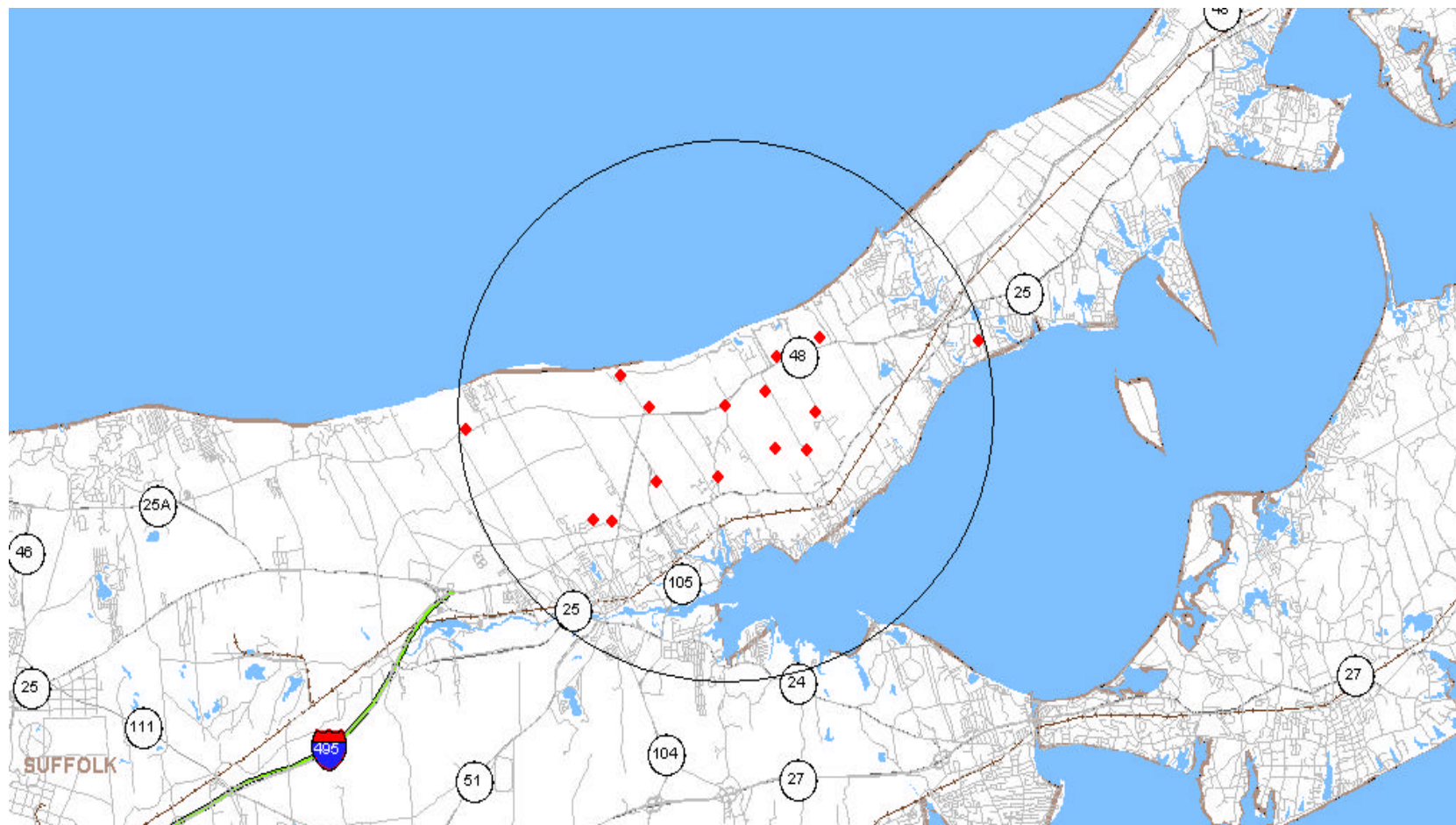
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Table 1. Listing of Case Horses

Animal ID	Date of Onset	Outcome	Date of Recovery or Death	Immunization History	Date Sampled
1	8-26	Improved	9-2	None in 99	10-13
2	8-28	Died	8-28	Unknown	
3	8-29	Died	8-29	None in 99	
4	8-31	Euthanized	8-31	None in 99	
5	9-7	Improved	9-21	Spring 99	10-13
6	9-7	Improved	9-8	Unknown	10-12
7	9-9	Improved	9-9	Unknown	10-12
8	9-12	Improved	10-3	Spring 99	10-12
9	9-12	Improved	9-20	Spring 99	10-12
10	9-12	Died	9-13	7-2-99	
11	9-17	Euthanized	9-20	May/June 99	
12	9-20	Improved	9-22	Unknown	10-12
13	9-24	Euthanized	9-24	None in 99	
14	9-27	Improved	9-29	4-21-99	10-13
15	9-27	Improved		7/99	10-12
16	9-25	Euthanized	10-1	Unknown	
17	10-3	Improved	10-8	Spring 99	10-13
18	10-4	Euthanized	10-8	Spring 99	
*19	10-17				10-12-99
*20	10-18				

* Newly recognized cases

Map 1. Geographic Location of Cases of CNS Disease in Horses - Jamesport, NY, 1999



Includes cases examined after October 17, 1999

Figure 1. Age Distribution of Cases of Equine Neurologic Disease - Jamesport, NY, 1999

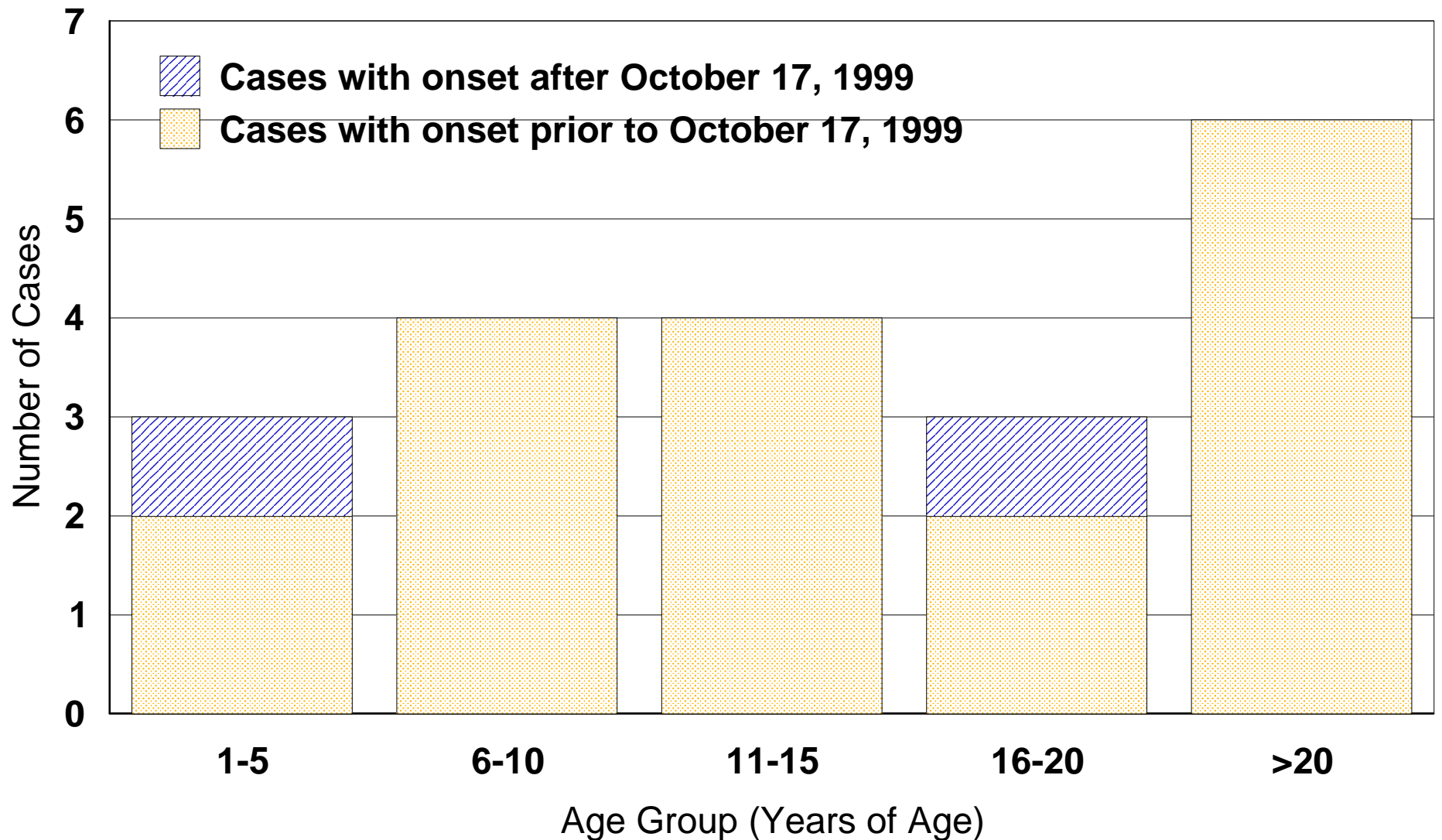


Figure 2. Number of Cases of Neurologic Disease in Horses by Week of Onset - Jamesport, NY 1999

